WHAT IS CLAIMED IS:

1. A detection probe comprising:

an external vesicle comprising a plurality of amphiphilic molecules forming a vesicle membrane;

a plurality of mass tag molecules encapsulated within the vesicle, within the vesicle membrane or adsorbed on the vesicle membrane; and

a probe attached to the vesicle.

2. The detection probe of claim 1, wherein the external vesicle is easily disrupted to release the mass tag molecules.

3. The detection probe of claim 1, wherein the plurality of mass tag molecules comprise at least a part of the vesicle membrane.

4. The detection probe of claim 1, further comprising at least one vesicle encapsulated within the external vesicle, at least a part of the external and encapsulated vesicles comprising the mass tag molecules.

5. The detection probe of claim 4, wherein the external and encapsulated vesicles are easily disrupted to release the mass tag molecule.

6. The detection probe of claim 1, wherein the external vesicle is a liposome.

7. The detection probe of claim 1, wherein the external vesicle is a polymersome.

8. The detection probe of claim 1, wherein the external vesicle is an emulsion.

9. The detection probe of claim 8, wherein the external vesicle is an oil-in-water (O/W) emulsion, water-in-oil-in-water (W/O/W) emulsion or solid-in-oil-in-water (S/O/W) emulsion.

10. The detection probe of claim 1, wherein the probe comprises at least one molecule selected from the group consisting of chemical residues, polynucleotides, polypeptides, and carbohydrates.

11. The detection probe of claim 10, wherein the molecule is immobilized.

12. The detection probe of claim 1, wherein the mass tag molecules are a biopolymer.

13. The detection probe of claim 1, wherein the mass tag molecules are a polynucleotide, polypeptide or polysaccharide.

14. The detection probe of claim 1, wherein the mass tag molecules are a synthetic polymer.

15. The detection probe of claim 1, wherein the mass tag molecules are a block copolymer.

16. The detection probe of claim 1, wherein the mass tag molecules are an amphiphilic molecule bound to a biopolymer or synthetic polymer.

17. The detection probe of claim 1, wherein the mass tag molecules are an amphiphilic molecule bound to a polynucleotide, polypeptide, polysaccharide or block copolymer.

18. A detection probe, comprising:

a body comprising a material that can become soluble upon physical or chemical stimulation and at least one mass tag molecule; and

a probe attached to the body.

19. The detection probe of claim 18, wherein the body comprises a soluble bead.

20. The detection probe of claim 19, wherein the soluble bead is porous.

21. The detection probe of claim 18, wherein the body comprises a soluble capsule.

22. The detection probe of claim 18, wherein the probe comprises at least one molecule selected from the group consisting of chemical residues, polynucleotides, polypeptides, and carbohydrates.

23. The detection probe of claim 22, wherein the molecule is immobilized.

24. The detection probe of claim 18, wherein the mass tag molecule is a biopolymer.

25. The detection probe of claim 18, wherein the mass tag molecule is a synthetic polymer.

26. A set of detection probes comprising:

a first detection probe comprising:

a first body comprising a material that can become soluble upon physical or chemical stimulation and at least one first mass tag molecule; and

a first probe attached to the first body; and

a second detection probe comprising:

a second body comprising a material that can become soluble upon physical or chemical stimulation and at least one second mass tag molecule; and

a second probe attached to the second body;

wherein the mass of the first mass tag molecule is different from the mass of the second mass tag molecule.

27. The set of detection probes of claim 26, wherein the first and second bodies comprise soluble beads.

28. The set of detection probes of claim 27, wherein the soluble beads are porous.

29. The set of detection probes of claim 26, wherein the first and second bodies comprise soluble capsules.

30. The set of detection probes of claim 26, wherein the first and second probes comprise at least one molecule selected from the group consisting of chemical residues, polynucleotides, polypeptides, and carbohydrates.

31. The set of detection probes of claim 30, wherein the molecule is immobilized.

32. The set of detection probes of claim 26, wherein the first and second mass tag molecules are biopolymers.

33. The set of detection probes of claim 32, wherein the biopolymers are polynucleotides, polypeptides or polysaccharides.

34. The set of detection probes of claim 26, wherein the first and second mass tag molecules are synthetic polymers.

35. The set of detection probes of claim 34, wherein the synthetic polymers are block copolymers.

36. The set of detection probes of claim 26, wherein the first and second mass tag molecules are amphiphilic molecules bound to a biopolymer or synthetic polymer.

37. The set of detection probes of claim 26, wherein the first and second mass tag molecules are amphiphilic molecules bound to a polynucleotide, polypeptide, polysaccharide or block copolymer.

38. A method of simultaneously assaying a plurality of different biological samples, each of said samples comprising a plurality of analytes, said method comprising:

immobilizing said analytes from each of said samples on a surface;

incubating said surface with the set of detection probes according to claim 26;

removing unbound detection probe;

collecting the first and second mass tag molecules from the bound detection probe; and

quantifying the first and second mass tag molecules collected.

39. The method of claim 38, wherein the binding of the first and second detection probe results from the binding of molecules.

40. The method of claim 39, wherein the molecules are DNA, RNA, aptamers, proteins, peptides, polysaccharides, or chemical residues on a biological molecule or small chemical molecule.

41. The method of claim 38, wherein the binding of the first and second detection probe results from the binding of complementary nucleotide sequences.

42. The method of claim 38, wherein the binding of the detection probes results from antigen-antibody binding.

43. The method of claim 38, wherein the binding of the first and second detection probes results from protein-protein binding.

44. The method of claim 38, wherein the binding of the first and second detection probes results from the binding of a chemical residue and a biological molecule.

45. The method of claim 38, wherein the mass tag molecules are collected after stimulation of the first and second detection probes.

46. The method of claim 45, wherein the stimulation is a solvent change, chemical addition, pH change, agitation, sonication, heating, laser irradiation, light irradiation or freeze-thaw process.

47. The method of claim 38, wherein the quantification method is selected from the group consisting of mass spectrometry, electrophoresis or chromatography.

48. A method of analyzing a plurality of different biological samples, each of said samples comprising a plurality of analytes, said method comprising:

labeling each sample with a detection probe according to claim 18, wherein the mass tag molecule of the detection probe labeling each sample has a different mass;

incubating the labeled sample with an immobilized target molecule capable of specifically binding to one of said analytes;

removing unbound labeled sample;

collecting the mass tag molecules from the bound probe; and

quantifying the mass tag molecules collected.

49. The method of claim 48, wherein the binding of the detection probe results from the binding of molecules.

50. The method of claim 48, wherein the molecules are DNA, RNA, aptamers, proteins, peptides, polysaccharides, chemical residues on biological molecules, or small chemical molecules.

51. The method of claim 48, wherein the binding of the detection probe results from the binding of complementary nucleotide sequences.

52. The method of claim 48, wherein the binding of the detection probe results from antigen-antibody binding.

53. The method of claim 48, wherein the binding of the detection probe results from protein-protein binding.

54. The method of claim 48, wherein the binding of the detection probe results from binding of the chemical residue and a biological molecule.

55. The method of claim 48, wherein the mass tag molecules are collected after stimulation of the detection probes.

56. A set of detection probes comprising:

a first detection probe comprising:

a first external vesicle comprising a plurality of amphiphilic molecules forming a first vesicle membrane;

a plurality of first mass tag molecules encapsulated within the first external vesicle, within the first vesicle membrane or adsorbed on the first vesicle membrane; and

a probe attached to the first external vesicle; and

a second detection probe comprising:

a second external vesicle comprising a plurality of amphiphilic molecules forming a second vesicle membrane;

a plurality of second mass tag molecules encapsulated within the second external vesicle, within the second vesicle membrane or adsorbed on the second vesicle membrane; and

a probe attached to the second external vesicle;

wherein the mass of the first mass tag molecules is different from the mass of the second mass tag molecules.

57. The set of detection probes of claim 56, wherein the first and second external vesicles are easily disrupted to release the mass tag molecule.

58. The set of detection probes of claim 56, wherein each of the first and second mass tag molecules is encapsulated within each of the first and second external vesicles, respectively.

59. The set of detection probes of claim 56, wherein each of the first and second mass tag molecules is encapsulated within each of the first and second vesicle membranes, respectively.

60. The set of detection probes of claim 56, wherein each of the first and second mass tag molecules is adsorbed on each of the first and second vesicle membranes, respectively.

61. The set of detection probes of claim 56, wherein the mass tag molecules comprise at least a part of the vesicle membranes.

62. The set of detection probes of claim 56, wherein each of the first and second external vesicles further comprise at least one encapsulated vesicle, at least a part of the external and encapsulated vesicles comprising the mass tag molecule.

63. The set of detection probes of claim 62, wherein the external and encapsulated vesicles are easily disrupted to release the mass tag molecules.

64. The set of detection probes of claim 56, wherein the external vesicles are liposomes.

65. The set of detection probes of claim 56, wherein the external vesicles are polymersomes.

66. The set of detection probes of claim 56, wherein the external vesicles are emulsions.

67. The set of detection probes of claim 66, wherein the emulsions are oil-in-water (O/W) emulsions, water-in-oil-in-water (W/O/W) emulsions or solid-in-oil-in-water (S/O/W) emulsions.

68. The set of detection probes of claim 56, wherein the probes each comprise at least one molecule selected from the group consisting of chemical residues, polynucleotides, polypeptides, and carbohydrates.

69. The set of detection probes of claim 68, wherein the molecule is immobilized.

70. The set of detection probes of claim 56, wherein the first and second mass tag molecules are biopolymers.

71. The set of detection probes of claim 70, wherein the biopolymer is a polynucleotide, polypeptide or polysaccharide.

72. The set of detection probes of claim 56, wherein the first and second mass tag molecules are synthetic polymers.

73. The set of detection probes of claim 72, wherein the synthetic polymer is a block copolymer.

74. The set of detection probes of claim 56, wherein the first and second mass tag molecules are amphiphilic molecules bound to a biopolymer or synthetic polymer.

75. The set of detection probes of claim 74, wherein the biopolymer is a polynucleotide, polypeptide, or polysaccharide.

76. The set of detection probes of claim 74, wherein the synthetic polymer is a block copolymer.

77. A method of simultaneously assaying a plurality of different biological samples, each of said samples comprising a plurality of analytes, said method comprising:

immobilizing said analytes from each of said samples on a surface;

incubating said surface with the set of detection probes according to claim 56;

removing unbound detection probe;

collecting the first and second mass tag molecules from the bound detection probe; and

quantifying the first and second mass tag molecules collected.

78. The method of claim 77, wherein the binding of the detection probe results from the binding of molecules.

79. The method of claim 78, wherein the molecules are DNA, RNA, aptamers, proteins, peptides, polysaccharides, chemical residues on biological molecules, or small chemical molecules.

80. The method of claim 77, wherein the binding of the detection probe results from the binding of complementary nucleotide sequences.

81. The method of claim 77, wherein the binding of the detection probe results from antigen-antibody binding.

82. The method of claim 77, wherein the binding of the detection probe results from protein-protein binding.

83. The method of claim 77, wherein the binding of the detection probe results from binding of chemical residues and biological molecules.

84. The method of claim 77, wherein the mass tag molecules are collected after stimulation of the detection probes.

85. The method of claim 84, wherein the stimulation is a solvent change, chemical addition, pH change, agitation, sonication, heating, laser irradiation, light irradiation or freeze-thaw process.

86. The method of claim 77, wherein the quantification method is selected from the group consisting of mass spectrometry, electrophoresis and chromatography.

87. A method of analyzing a plurality of different biological samples, each of said samples comprising a plurality of analytes, said method comprising:

labeling each sample with a detection probe according to claim 1, wherein the mass tag molecules of the detection probe labeling each sample have a different mass;

incubating the labeled sample with an immobilized target molecule capable of specifically binding to one of said analytes;

removing unbound labeled sample;

collecting the mass tag molecules from the bound probe; and

quantifying the mass tag molecules collected.

88. The method of claim 87, wherein the binding of the detection probe results from the binding of molecules.

89. The method of claim 88, wherein the molecules are DNA, RNA, aptamers, proteins, peptides, polysaccharides, chemical residues on biological molecules, or small chemical molecules.

90. The method of claim 87, wherein the binding of the detection probe results from the binding of complementary nucleotide sequences.

91. The method of claim 87, wherein the binding of the detection probe results from antigen-antibody binding.

92. The method of claim 87, wherein the binding of the detection probe results from protein-protein binding.

93. The method of claim 87, wherein the binding of the detection probe results from the binding of chemical residues and biological molecules.

94. The method of claim 87, wherein the mass tag molecules are collected after stimulation of the detection probes.

95. The method of claim 94, wherein the stimulation is a solvent change, chemical addition, pH change, agitation, sonication, heating, laser irradiation, light irradiation or freeze-thaw process.

96. The method of claim 87, wherein the quantification method is selected from the group consisting of mass spectrometry, electrophoresis and chromatography.

97. A method of simultaneously assaying a plurality of different biological samples, each of said samples comprising a plurality of analytes, said method comprising:

immobilizing said analytes from each of said samples on a surface;

incubating said surface with a set of detection probes comprising:

a first detection probe comprising:

a first external vesicle comprising a plurality of first mass tag molecules forming a first vesicle membrane, and a probe attached to the first external vesicle; and

a second detection probe comprising:

a second external vesicle comprising a plurality of second mass tag molecules forming a second vesicle membrane, and a probe attached to the second external vesicle;

removing unbound detection probe;

collecting the first and second mass tag molecules from the bound detection probe; and

quantifying the first and second mass tag molecules collected.

98. The method of claim 97, wherein the binding of the detection probe results from the binding of molecules.

99. The method of claim 98, wherein the molecules are DNA, RNA, aptamers, proteins, peptides, polysaccharides, chemical residues on biological molecules, or small chemical molecules.

100. The method of claim 97, wherein the binding of the detection probe results from the binding of complementary nucleotide sequences.

101. The method of claim 97, wherein the binding of the detection probe results from antigen-antibody binding.

102. The method of claim 97, wherein the binding of the detection probe results from protein-protein binding.

103. The method of claim 97, wherein the binding of the detection probe results from binding of chemical residues and biological molecules.

104. The method of claim 97, wherein the mass tag molecules are collected after stimulation of the detection probes.

105. The method of claim 104, wherein the stimulation is a solvent change, chemical addition, pH change, agitation, sonication, heating, laser irradiation, light irradiation or freeze-thaw process.

106. The method of claim 97, wherein the quantification method is selected from the group consisting of mass spectrometry, electrophoresis or chromatography.

107. A method of analyzing a plurality of different biological samples, each of said samples comprising a plurality of analytes, said method comprising:

labeling each sample with a detection probe comprising:

an external vesicle comprising a plurality of mass tag molecules forming a vesicle membrane and a probe attached to the vesicle,

wherein the mass tag molecules of the detection probe labeling each sample have a different mass;

incubating the labeled sample with an immobilized target molecule capable of specifically binding to one of said analytes;

removing unbound labeled sample;

collecting the mass tag molecules from the bound probe; and

quantifying the mass tag molecules collected.

108. The method of claim 107, wherein the binding of the detection probe results from the binding of molecules.

109. The method of claim 108, wherein the molecules are DNA, RNA, aptamers, proteins, peptides, polysaccharides, chemical residues on biological molecules, or small chemical molecules.

110. The method of claim 107, wherein the binding of the detection probe results from the binding of complementary nucleotide sequences.

111. The method of claim 107, wherein the binding of the detection probe results from antigen-antibody binding.

112. The method of claim 107, wherein the binding of the detection probe results from protein-protein binding.

113. The method of claim 107, wherein the binding of the detection probe results from the binding of chemical residues and biological molecules.

114. The method of claim 107, wherein the mass tag molecules are collected after stimulation of the detection probes.

115. The method of claim 114, wherein the stimulation is a solvent change, chemical addition, pH change, agitation, sonication, heating, laser irradiation, light irradiation or freeze-thaw process.

116. The method of claim 107, wherein the quantification method is selected from the group consisting of mass spectrometry, electrophoresis and chromatography.